DESEAMOS CANJE CON PUBLICACIONES SIMILARES
WE WISH TO ESTABLISH EXCHANGE OF PUBLICATIONS

Ignacio Morales Sr.

ESTADO LIBRE ASOCIADO DE PUERTO RICO
COMMONWEALTH OF PUERTO RICO

DEPARTAMENTO DE AGRICULTURA
DEPARTMENT OF AGRICULTURE

ÁREA DE SERVICIOS ESPECIALES
AREA OF SPECIAL SERVICES

LABORATORIO DE PESQUERIA COMERCIAL
COMMERCIAL FISHERIES LABORATORY

PUERTO RICO'S FISHERY STATISTICS 1968-1969

por José A. Suárez-Caabro

CONTRIBUCIONES AGROPECUARIAS Y PESQUERAS
AGRICULTURAL AND FISHERIES CONTRIBUTIONS

ORGANO OFICIAL DEL AREA DE SERVICIOS ESPECIALES
OFFICIAL PUBLICATIONS OF THE AREA OF SPECIAL SERVICES

Volumen II (2da. Edición) Número 1
Volume II (2nd. Edition) Number 1

Abril 1975
April 1975

Cabo Rojo, Puerto Rico

ESTADO LIBRE ASOCIADO DE PUERTO RICO
COMMONWEALTH OF PUERTO RICO

DEPARTAMENTO DE AGRICULTURA
DEPARTMENT OF AGRICULTURE

ÁREA DE SERVICIOS ESPECIALES
AREA OF SPECIAL SERVICES

LABORATORIO DE PESQUERIA COMERCIAL.
COMMERCIAL FISHERIES LABORATORY

PUERTO RICO'S FISHERY STATISTICS 1968-1969

por José A. Suárez-Caabro

CONTRIBUCIONES AGROPECUARIAS Y PESQUERAS
AGRICULTURAL AND FISHERIES CONTRIBUTIONS

ORGANO OFICIAL DEL AREA DE SERVICIOS ESPECIALES
OFFICIAL PUBLICATIONS OF THE AREA OF SPECIAL SERVICES

Volumen II (2da. Edición) Número 1
Volume II (2nd. Edition) Number 1

Abril 1975
April 1975

Cabo Rojo, Puerto Rico

El Departamento de Agricultura, bajo la dirección del Secretario Dr. Luis Rivera Brenes comenzó la publicación de sus Contribuciones Agropecuarias y Pesqueras, en septiembre de 1969, con un trabajo de Rolf Juhl sobre Exploración Pesquera y Prueba de Artes de Pesca, en aguas de Puerto Rico.

A continuación ofrecemos una nueva colaboración, esta vez *sobre Estadística Pesquera Marina* a cargo de José A. Suárez-Caabro. Ambos trabajos se han realizado con fondos combinados del Departamento del Interior de los Estados Unidos (PL-88-309) y del Estado Libre Asociado de Puerto Rico.

El trabajo de Suárez-Caabro presenta los resultados del Proyecto de Estadística Pesquera Marina, efectuado como parte del Programa de Investigación y Desarrollo Pesquero (PL-88-309), durante 1968-1969 y las conclusiones de la encuesta sobre pescadores, embarcaciones y artes de pesca, ejecutada en los centros pesqueros de la Isla, en el mismo proyecto.

Consideramos que ambas publicaciones serán de utilidad para los interesados en la industria pesquera puertorriqueña y, especialmente, contribuirán al mejoramiento de la misma.

Departamento de Agricultura

CONTENTS

PUERTO RICO'S COMMERCIAL MARINE FISHERY STATISTICS 1968-1969*

by José A. Suárez-Caabro**

---

* Authority to undertake this program was granted through the Commercial Fisheries Research and Development Act of 1964, known as PL-88-309.

** Project Leader Fishery Statistics Program, Department of Agriculture.

TABLES

FIGURES

RESUMEN

Se ha establecido en Puerto Rico un sistema de estadística pesquera para obtener información sobre la producción de las pesquerías locales. Se describe el procedimiento y el trabajo de campo que realizan los agentes estadísticos. La producción reportada, de pescado y marisco, en Puerto Rico durante el año económico 1968-1969 fue de 2.14 millones de libras. La cifra más alta ocurrió en la costa oeste y la más baja en la norte. Solamente Cabo Rojo produjo casi el 30% del total de los desembarcos. Otros centros pesqueros importantes fueron la Isla de Vieques, Fajardo, Guánica, Lajas, Aguadilla, Mayaguez, Humacao y Naguabo. El precio promedio pagado al nivel del pescador (incluyendo pescado y marisco) durante julio de 1968 a junio 1969 fue de 28 centavos. Las especies reportadas más comunes fueron: pargo (35%), sierra (28%) y mero (12%).

En septiembre de 1969 existían 991 pescadores (regulares, casuales y compañeros) y 787 embarcaciones de pesca de propulsión a motor, remos y motor y vela. El porcentaje más alto de pescadores regulares (34%) apareció en la costa oeste, que es la más productiva. El 76% de las embarcaciones de pesca eran de motor y el 24% de otro tipo. El porcentaje más alto de botes motor se encontró en la costa sur (33%). El número total de unidades de

artes de pesca de todos los tipos en septiembre de 1969 ascendió a 12,125. La nasa convencional es el arte más corriente en Puerto Rico (62.8%), seguida por la silga, la cala, la nasa langostera, la atarraya, el volante de carey, el trasmallo (filete) y el palangre.

INTRODUCTION

Puerto Rico's fishing industry presents a great contrast. A modern, productive and highly capitalized tuna fleet is contrasted with an inshore fishery that has not changed substantially in several generations (Holmsen, 1967).

During the present century several papers have dealt with the Puerto Rican fisheries. Among them we have the following: Wilcox (1902, 1904), Jarvis (1932), Diaz, Velez and Vazquez (1943), Anonymous (1944), Kahn (1949), Soler (1951), Iñigo (1952, 1953), Feliciano (1958, 1962), Hess (1960), FAO (1962), Idyll (1966), Holmsen (1966, 1967), Iñigo and Juhl (1967, 1968), Dibbs (1967), Anonymous (1968), and Juhl (1969). Most of those publications offer a general appreciation about economic, social and practical aspects, especially on the domestic fisheries.

Evaluation of the inshore marine fisheries of Puerto Rico, using statistical information, started in July 1967 as part of the Fisheries Research and Development Program (PL-88-309), under cosponsorship of the United States Department of the Interior and the Department of Agriculture, Commonwealth of Puerto Rico. The Institute of Marine Science of the University of Miami acted as technical adviser of this Statistical Project, since July 1967 through June 1969.

The main objetive of the project is to establish a system for obtaining data on landings and sales of fish and shellfish in Puerto Rico's inshore fisheries that, in addition to assisting the local fishing industry, will also fill the statistical needs of the Bureau of Commercial Fisheries and other interested agencies. Statistical data include number and types of fishing craft, number and quantities of fishing gear and number of fishermen.

The purpose of this paper is to offer the results of the 1968-1969 Fishery Statistics Program activities, and the conclusions of the 1969 survey of fishermen, craft and gear, both carried out under PL-88-309.

COLLECTION OF STATISTICAL DATA

To gather the statistical data the following steps have been taken: a) a sales ticket system was implemented to obtain information on weight and value of local fish and shellfish landings; b) for the purpose of collecting the data on the field five statistical agents were hired; c) a list of fish nomenclature was prepared of commercially important species; d) preliminary data was assessed to estimate total landings; e) fishermen's license data was processed to determine vital statistics and related information; f) a preliminary fishing survey was conducted in two fishing centers; and g) publicity releases were circulated to inform the industry. The results of these preliminary steps appear in Caillouet, Garcia and Higman (1968) and Caillouet and Higman (1969).

Procedure and field work

To collect the statistical data, from the fish dealers and fishermen, one or two agents were assigned to the following areas (fig. 1):

Area A - Cataño to Maunabo, including Culebra and Vieques Islands (two agents living in San Juan).

Area B - Patillas to Guayanilla (one agent living in Ponce).

Area C - Guanica to Isabela (one agent living in Mayaguez).

Area D - Quebradillas to Toa Baja (one agent living in Arecibo).

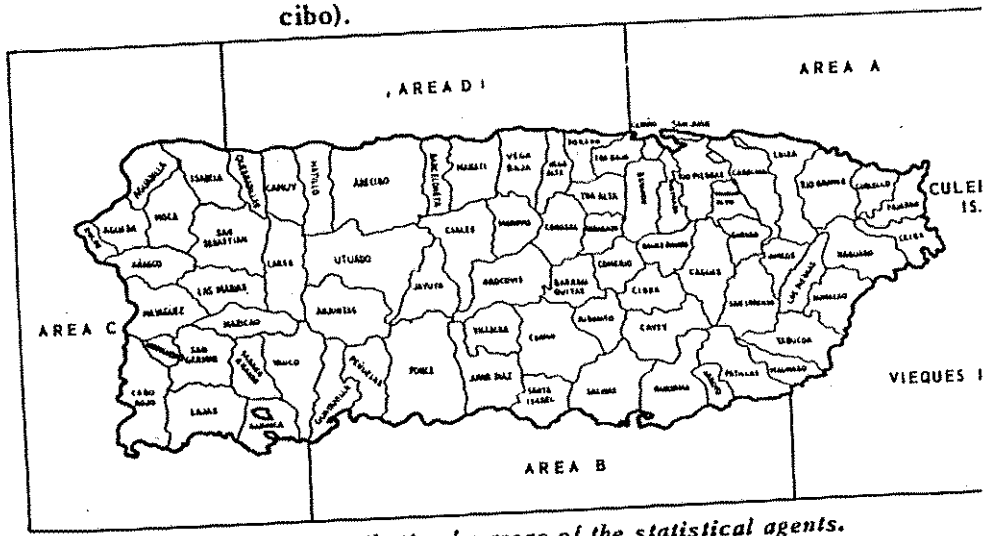

Fig. 1 - Distribution by areas of the statistical agents.

The statistical agents visit at least once a week each of the contributing fish dealers or fishermen in their areas. Because of their peculiarities some fishing centers such as San Juan, Yabucoa, Ponce, Mayaguez, Arecibo and Cataño, are visited more than once a week.

However, the accuracy of all data and information depends upon the willingness of fish dealers and fishermen to cooperate, and upon the ability of the statistical agents to gain such cooperation and record the data accurately. This situation has progressively improved since the beginning of the project two years ago.

Currently, there are about 200 fish dealers and fishermen cooperating with this project. A study of 11,410 processed tickets, from July to December 1968, gathered from those fish dealers and fishermen, showed that we have been receiving information on weight and value of fish and shellfish of some 800 fishermen throughout the island.

Data processing

Every Monday the statistical agents bring all the tickets collected during the week to the central office in San Juan for a complete check and review. Later the tickets are sent to the Office of Statistics, of the Department of Agriculture, for summarization and tabulation. Evaluation of the results is carried out by the Project Leader and the Coordinator of the Fisheries Development Program.

Publicity

Advertising about the statistics project was issued by several news media, with the cooperation of the Office of Public Relations of the Department of Agriculture.

Publication of the project is released by radio and television announcements. A short action-movie "spot" was filmed at Puerto Real, Cabo Rojo (west coast) for television and movies advertising. This was shown in approximately 50 theaters, and also was televised over five major stations during several months. Furthermore, an active campaign of posters is being undertaken in all fishing centers.

LANDINGS OF FISH AND SHELLFISH, 1968-1969

Currently the information which is gathered through the sale tickets system is coming directly or indirectly from a substantial number of fishermen; in the author's opinion at least 70% of the total landings are being collected now by this method. However, one of the most important goals of this project is to determine with greater accuracy what percentage of the total landings is being obtained by means of this sales ticket system.

Distribution of landings

Table 1 is a summary of the distribution of the reported landings by coastal region and municipality,* based on all data obtained from July 1968 through June 1969 (fig. 2).

Production is highest on the west coast of the island and lowest on the north coast. Since the statistics was started in October 1967 Cabo Rojo has alone produced consistently nearly 30% of the reported landings of fish and shellfish for the entire island. This represents about 23% of the ex-vessel value of the island's production.

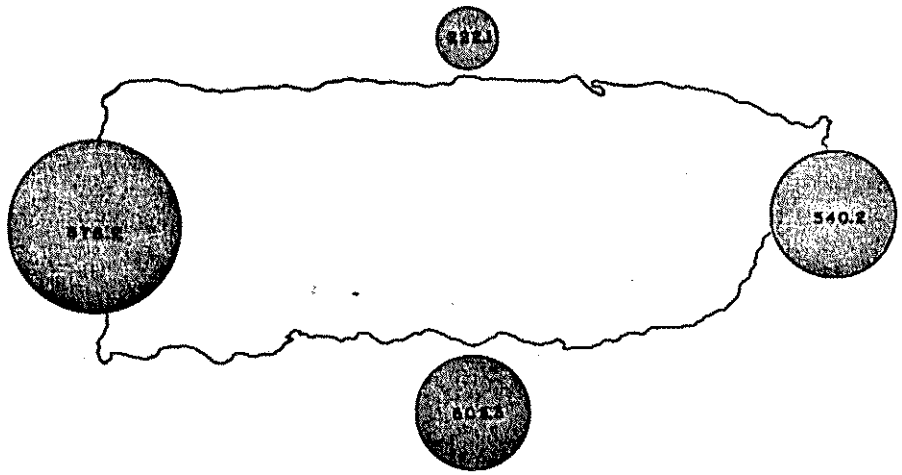

Fig. 2 - Reported landings in thousand pounds by coastal regions of Puerto Rico's insbore commercial fisheries (July 1968 - June 1969).

*Each municipality includes one or more fishing centers.

After Cabo Rojo, the more productive fishing centers were Vieques Island and Fajardo (east coast), Guanica and Lajas (south west coast), Aguadilla and Mayaguez (west coast) and Naguabo and Humacao (east coast); see Table 1. Cabo Rojo and the above areas together produce 66% of Puerto Rico's total reported production.

Table 2 shows the distribution by regions of reported landings and ex-vessel value of landings by market classes of fish and shellfish in Puerto Rico (June 1968-July 1969).

Table 1 - Regional distribution of reported landings and ex-vessel value of landings of commercial marine fish and shellfish from Puerto Rican coastal waters (July 1968 - June 1969) (Thousands of Pounds and Thousands of Dollars)

REGION AND MUNICIPALITY	QUANTITY	VALUE
North Coast	222.1	83.6
Isabela	2.1	1.4
Quebradillas	1.8	1.3
Camuy	1.5	0.9
Hatillo	3.3	1.0
Arecibo	29.5	12.4
Barceloneta	18.9	6.0
Manatí	5.0	1.8
Vega Baja	16.1	5.5
Vega Alta	5.6	2.8
Dorado	5.0	1.9
Toa Baja	11.3	4.8
Cataño	36.6	11.3
San Juan	39.6	14.2
Carolina	0.4	0.1
Loíza	29.4	10.1
Luquillo	16.0	8.1
South Coast	503.3	149.8
Patillas	58.4	15.5
Arroyo	35.7	10.1
Guayama	42.6	13.6
Salinas	26.6	8.6
Santa Isabel	16.2	5.3
Juana Díaz	65.4	21.4
Ponce	21.3	6.8
Peñuelas	3.9	1.6
Guayanilla	34.6	10.1
Guánica	104.3	32.5
Lajas	94.3	24.3

East Coast	540.2	169.5
Fajardo	107.4	35.0
Ceiba	43.8	14.5
Naguabo	85.8	27.4
Humacao	72.7	18.9
Yabucoa	52.0	16.0
Maunabo	24.9	7.8
Vieques Island	120.0	34.7
Culebra Island	33.6	15.2
West Coast	876.2	205.6
Cabo Rojo	645.5	140.1
Mayaguez	93.9	30.8
Añasco	5.9	2.3
Rincón	18.0	5.4
Aguada	18.1	4.1
Aguadilla	94.8	22.9
TOTAL	2,141.8	608.5

Table 2 - Distribution by regions of reported landings and ex-vessel value of landings by marketing classes* of commercial marine fish and shellfish from Puerto Rican coastal waters. (July 1968 - June 1969)

(Thousands of Pounds and Thousands of Dollars)

MARKETING CLASS	NORTH COAST		SOUTH COAST		EAST COAST		WEST COAST		TOTAL	
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE
Fish	204.2	70.2	436.4	109.3	431.2	107.1	804.0	159.7	1875.8	446.3
First Class	125.3	49.2	184.7	55.4	172.8	51.7	287.4	90.4	770.2	246.7
Second Class	48.7	14.1	192.6	46.2	96.1	24.0	311.2	52.9	648.6	137.2
Third Class	27.1	6.5	59.1	7.7	151.9	30.4	205.2	16.4	443.3	61.0
Non-edible	3.1	0.4	-------	-------	10.4	1.0	0.2	0.02	13.7	1.4
Shellfish	15.8	13.0	66.7	40.4	87.8	60.1	71.6	45.8	241.9	159.3
Spiny Lobster	8.9	7.8	42.6	31.7	71.2	53.0	56.7	39.6	179.4	132.1
Land Crab	2.0	2.2	2.3	0.5	0.2	0.2	-------	-------	4.5	2.9
Conch	0.9	0.5	7.6	2.4	8.5	3.8	8.7	3.5	25.7	10.2
Octopus	2.5	1.8	7.1	3.7	1.5	0.8	1.2	0.6	12.3	6.9
Sea Turtle	1.5	0.7	7.1	2.1	6.4	2.3	5.0	2.1	20.0	7.2
Others	2.1	0.4	0.2	0.1	21.2	2.3	0.6	0.1	24.1	2.9
Total	222.1	83.6	503.3	149.8	540.2	169.5	876.2	205.6	2141.8	608.5

* For explanation of marketing classes see Caillouet, García and Higman (1968) pp. 6-11

The average price paid to fishermen (for fish and shellfish combined) during July 1968 through June 1969 was $0.28. It is well to note that lowest price is recorded from the west coast ($0.23) and the highest from the north coast ($0.38).

Fish represent 87.6% of the weight (fig. 3) and 73% of the ex-vessel value of the landings. Of the shellfish, spiny lobster (including some sand lobsters) was the most abundant, representing 8.4% by weight and 22% by value. It also brings the highest ex-vessel price per pound ($0.74) of any of the marketing classes of fish and shellfish, though land crab is close behind it at $0.64 per pound. The remaining 4% of the landings were other shellfish and turtle. These values represent averages for the whole island, but price per pound varies regionally (Caillouet and Higman, 1969).

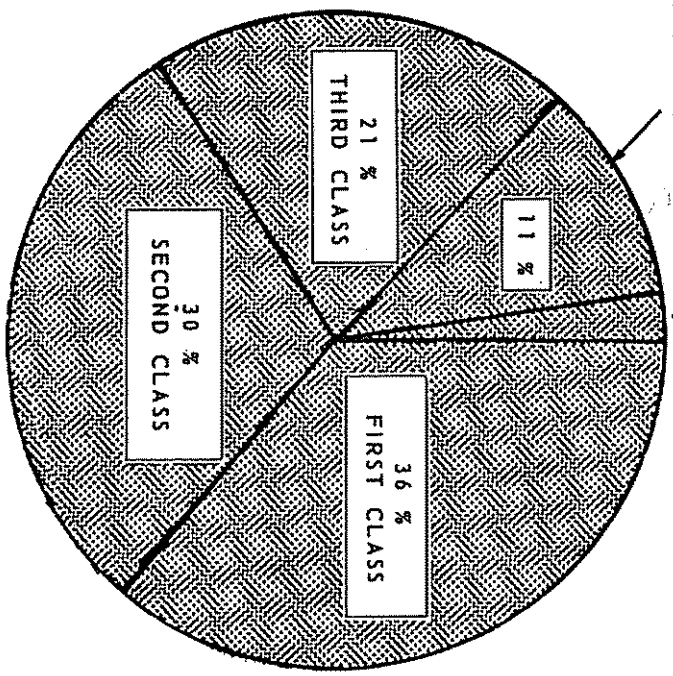

Fig. 3 - Distribution of marketing classes of fish and shellfish reported from Puerto Rico's coastal waters (July 1968 - June 1969).

Even if information is available for the past two years reliable data are not available and it is difficult and premature to make accurate estimates of annual production and seasonal variation. If the magnitude of reported landings of previous years is compared with data from July 1968 through May 1969 it can be concluded that the figures have increased steadily since July 1968 (fig. 4). However, it is still questionable whether this increase represents part of a seasonal cycle of availability of fish and shellfish, or simply an improvement in data acquisition, or both.

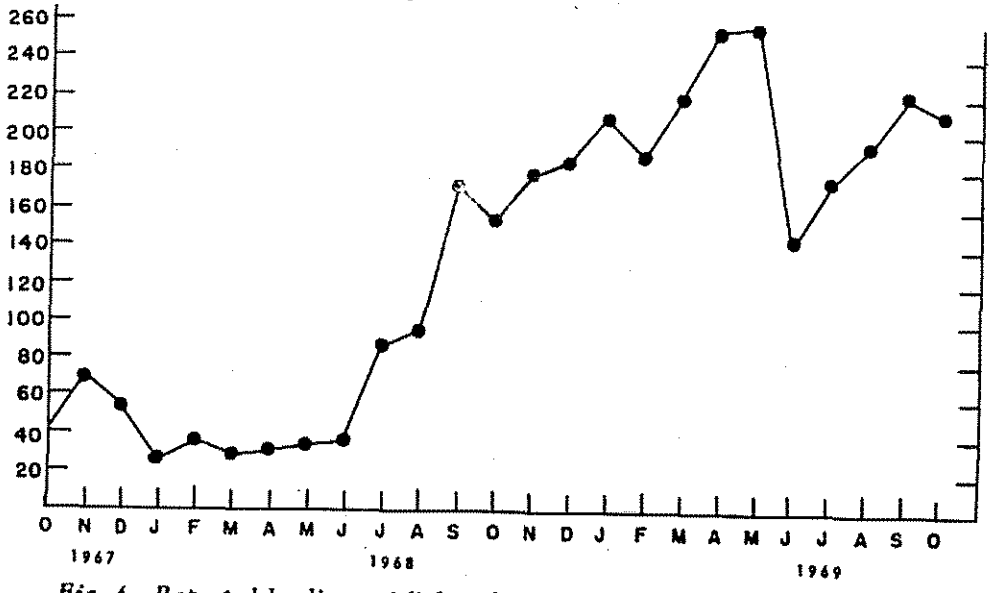

Fig. 4 - Reported landings of fish and shellfish from the island's coastal waters since October 1967 through October 1969.

Composition of catch

Accurate information on composition of catch in Puerto Rico's landings of fish and shellfish is extremely difficult to obtain owing to the diversity of species found in the catches and the lack of fish landing records kept by fish dealers and fishermen. The author has seen up to fifteen or twenty different species in one single catch. However, during the present year the statistical agents have gathered substantial information about the composition by species of the first market class (Table 3).

In agreement with personal communication of Erdman* (1969) and Caillouet, Garcia and Higman (1968), in Puerto Rico's coastal

*Donald S. Erdman, Division of Fish and Wildlife, Department of Agriculture, Commonwealth of Puerto Rico.

waters there are roughly 130 species of commercially important fish, including all market classes. Among these species we find about 30 for first class, but the most common are: hogfish, *Lachnolaimus maximus*; king mackerel, *Scomberomorus cavalla*; trunkfishes, *Lactophrys* spp; Nassau grouper, *Epinephelus striatus*; silk snapper, *Lutjanus vivanus*; yellowtail snapper, *Ocyurus chrysurus*; dolphin, *Coryphaena hippurus*; yellowfin grouper, *Mycteroperca venenosa*; mysty grouper, *Epinephelus mystacinus*; blackfin snapper, *Lutjanus buccanella*; wahoo, *Acanthocybium solandri*; barracuda, *Sphyraena barracuda*; snook, *Centropomus undecimalis* and mutton snapper, *Lutjanus analis*. Most of those species have also been reported by Juhl (1969) for the coastal waters of the island.

Table 3 shows that the most common classified fish are: snapper (35%), mackerels (28%) and groupers (12%).

Table 3 - Distribution of reported landings and ex-vessel value by species of commercial marine fish and shellfish from Puerto Rican coastal waters (July 1968 - June 1969)

(Thousands of Pounds and Thousands of Dollars)

SPECIES	QUANTITY	VALUE
Fish		
Barracuda	45.5	14.0
Blue Marlin	2.0	0.1
Dolphin	24.4	6.8
Goatfishes	1.0 ✓	0.2
Groupers	94.5	28.0
Grunts	1.1 ✓	0.2
Halfbeaks	9.0	2.0
Hogfish	16.2 ✓	4.9
Jacks	30.8	8.7
Mackerel:		
King	216.6	66.7
Mullets	0.8	0.2
Porgies	2.1 ✓	0.4
Snapper:		
Silk	115.4	49.2
Mutton	27.0 ✓	8.0
Yellowtail	81.0 ✓	26.4
Lane	25.0 ✓	7.4
Vermilion	0.2	0.1

(CONTINUED ON NEXT PAGE)

Blackfin	0.4	0.1
Unclassified	18.4	5.7
Snooks	22.0	7.0
Trunkfish	13.2	4.3
Tunas	22.4	5.9
Wahoo	1.2	0.4
Unclassified	1,091.9	198.2
Non-edible	13.7	1.4
Shellfish		
Spiny lobster	179.4	132.1
Land crab	4.5	2.9
Conch	25.7	10.2
Octopus	12.3	6.9
Sea turtle	20.0	7.2
Others	24.1	2.9
Total	2,141.8	608.5

Shellfish are represented mainly by 74% spiny lobster, *Panulirus argus*; 11% conch, *Strombus gigas*; 8% sea turtles, *Eretmochelys imbricata*, *Caretta caretta*, *Chelonia mydas* and *Dermochelys coriacea*; 5% octopus, *Octopus vulgaris*; and 2% land crab, *Cardisoma guanhumi*.

SURVEY OF FISHERMEN, CRAFT AND GEAR

Number of fishermen, craft and gear are needed for a meaningful appraisal of the fishing effort in Puerto Rico. At every fishing center, throughout the island, a survey was undertaken to complement the statistical project.

An intensive field work, interviewing and questioning fish dealers, fishermen, Fish and Game Wardens of the Division of Fish and Wildlife, of the Department of Agriculture, and other people engaged in marine commercial fisheries, was carried out, personally by the author and by the statistical agents under his supervision, during April to September 1969.

The total number of fishermen was determined on the basis of information recorded in 2.131 fishing license applications, for the fiscal year 1968-1969. Interviews were based on three main

questions: fisherman's status (regular, casual, deckhand), type of boat (name, registration number, propulsion, dimensions) and type of gear (number, quantity). Experience gained in dealing with Puerto Rican fishermen indicated that some other questions would not be accurately answered.

Definitions of terms

Characteristics of this fishing survey are based on personal communication of Snow* (1969), Anonymous (1964), FAO (1966) and Dumont and Sundstrom (1961).

Definitions of terms for the purpose of this survey is as follows:

Fishermen: persons engaged in commercial catching and selling of fish or shellfish.

Regular Fishermen: fishermen receiving at least 50% of their livelihood from fishing activities or spending at least 50% of their working time in that occupation.

Casual Fishermen: fishermen receiving less than 50% of their working time in that occupation.

Deckhands: fishermen who usually have neither boats nor gear but work on fishing boats. These were classified either regular or casual.

Crew: total number aboard a commercial fishing boat.

Boat-motor: any motor driven commercial fishing craft having a capacity of less than 5 net tons.

Boat-other:** any non-motor (row, sail, etc.) driven fishing craft, having a capacity of less than 5 net tons. Boats driven by both motor and sail are included in this group only for the purpose of this survey.

Gear: any kind of apparatus actually employed in catching the fish in Puerto Rico. Examples: hand line, gill net, fish pot, etc.

*George W. Snow, Fishery Statistical Office, South Atlantic and Gulf, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, Department of the Interior.

**Anonymous, 1964.

Gear number: the greatest number of units in use at one time. Examples: 2 troll lines, 10 tangle nets, 1 spear, etc.

Quantity of gear: the greatest quantity of gear utilized at any one time. Examples: 750 square yards gill net, 1,000 hooks, etc.

Catch: the quantity of fish or shellfish taken with fishing gear and sold. Catch for the purposes of this report is synonymous with landings (Anonymous, 1964).

Fishermen and craft

Distribution of fishermen and boats in Puerto Rico are shown in figure 5 (Table 4). There were 991 fishermen (regular, casual and deckhand) and 787 fishing boats (motor and other).

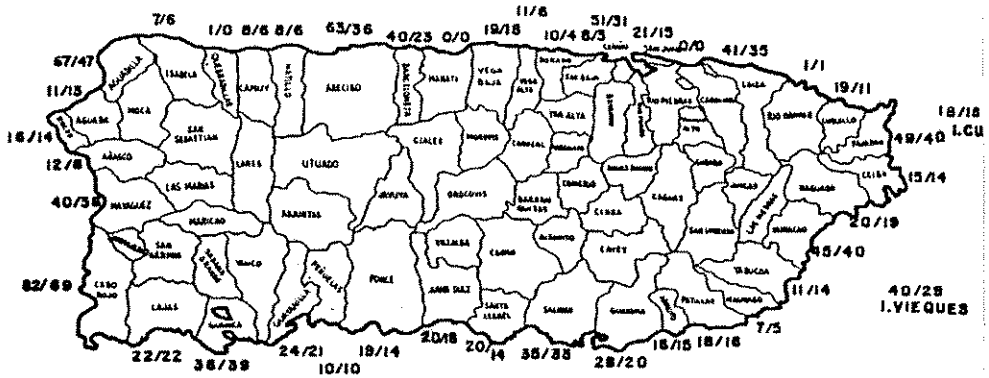

Fig. 5 - Distribution of fishermen and craft in Puerto Rico, 1969. The fractions mean: fisherman (numerator) and craft (denominator).

On the entire island 38% of the fishermen were regular; and 62%, casual. Most of the fishermen were boat owners; 80% of the regular and 69% of the casual fishermen have their own boats.

The distribution of fishermen by region (Table 4) is significant. On the west coast, which is the most productive area, are found the highest number of regular fishermen (34%). Conversely, the lowest number of regular fishermen (15%) are found on the north coast, which is the area showing the lowest production.

Table 4 shows 76% of the fishing craft are boat-motor and 24% boat-other (sail, row, motor and sail). The highest number of motor boats, occur on the south coast (33%), followed by the east coast (25%), the north coast (23%) and the west coast (19%).

A few fishing boats driven by sail or motor and sail occur in

Puerto Rico (Table 5, fig. 6). Sail boats are solely 3% of the boat-other, and motor and sail reach only 11%. Row boats number about 85% and among them the highest number is located at the north coast (38%), followed by the west coast (30%), the east coast (18%) and the south coast (14%).

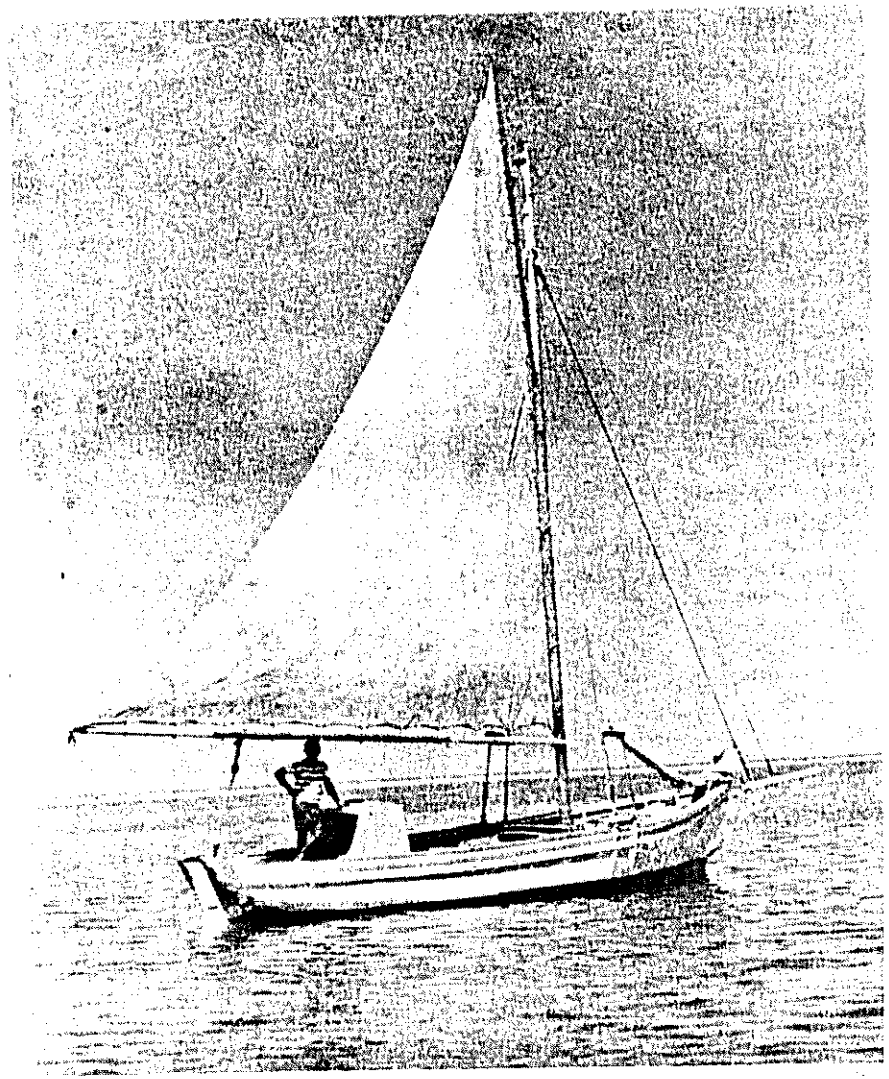

Fig. 6 - 27-foot motor and sail fishing boat at El Combate, Cabo Rojo.

The most popular Puerto Rico's commercial fishing boat is called "yola" (fig. 7). This is largely a flat-bottom skiff of the

(CONTINUED ON PAGE 24

Table 4 - Regional distribution of fishermen and craft in Puerto Rico's inshore fishery, 1969.

REGION AND MUNICIPALITY	FISHERMEN				BOATS			
	REGULAR	CASUAL	TOTAL	%	MOTOR	OTHER	TOTAL	%
North Coast	57	251	308	31.0	137	64	201	25.6
Isabela	2	5	7	0.7	5	1	6	0.8
Quebradillas	0	1	1	0.1	0	0	0	0
Camuy	0	8	8	0.8	6	0	6	0.8
Hatillo	0	8	8	0.8	5	1	6	0.8
Arecibo	14	49	63	6.4	24	12	36	4.6
Barceloneta	6	34	40	4.0	15	8	23	3.0
Manatí	0	0	0	0	0	0	0	0
Vega Baja	5	14	19	1.8	12	6	18	2.3
Vega Alta	0	11	11	1.1	5	1	6	0.8
Dorado	0	10	10	1.0	4	0	4	0.5
Toa Baja	0	8	8	0.8	1	2	3	0.4
Cataño	8	43	51	5.2	20	11	31	4.0
San Juan	7	14	21	2.1	15	0	15	1.9
Carolina	0	0	0	0	0	0	0	0
Loíza	12	29	41	4.1	20	15	35	4.4
Río Grande	0	1	1	0.1	1	0	1	0.1
Luquillo	3	16	19	2.0	4	7	11	1.4
South Coast	100	150	250	25.0	197	25	222	28.2
Patillas	12	6	18	1.8	12	4	16	2.0
Arroyo	5	11	16	1.6	14	1	15	1.9
Guayama	7	21	28	2.5	18	2	20	2.5
Salinas	16	19	35	3.5	27	6	33	4.2
Santa Isabel	7	13	20	2.0	10	4	14	1.8
Juana Díaz	10	10	20	2.0	18	0	18	2.3
Ponce	5	14	19	2.0	10	4	14	1.8
Peñuelas	0	10	10	1.0	10	0	10	1.3
Guayanilla	10	14	24	2.4	20	1	21	2.7
Guánica	17	21	38	3.9	38	1	39	5.0
Lajas	11	11	22	2.2	20	2	22	2.8
East Coast	92	113	205	21.0	149	30	179	22.7
Fajardo	17	32	49	5.0	34	6	40	5.1
Ceiba	5	10	15	1.5	12	2	14	1.8
Naguabo	12	8	20	2.0	18	1	19	2.4
Humacao	12	33	45	4.6	30	10	40	5.1
Yabucoa	6	5	11	1.1	10	4	14	1.8
Maunabo	0	7	7	0.8	2	3	5	0.6
Culebra Is	9	9	18	2.0	15	3	18	2.3
Vieques Is	31	9	40	4.1	28	1	29	3.7
West Coast	127	101	228	23.0	112	73	185	23.5
Cabo Rojo	63	19	82	8.3	43	26	69	8.8
Mayaguez	8	32	40	4.1	23	13	36	4.6
Añasco	2	10	12	1.2	3	3	6	0.8
Rincón	6	10	16	1.5	6	8	14	1.8
Aguada	4	7	11	1.1	1	12	13	1.7
Aguadilla	44	23	67	6.8	36	11	47	6.0
Total	376	615	991	100.0	595	192	787	100.0

Table 5 - Distribution of boat-other (row, sail, motor and, sail) of Puerto Rico's commercial fishery by coastal region and municipality in 1969

REGION AND MUNICIPALITY	ROW	MOTOR AND SAIL	SAIL	TOTAL	%
North Coast	63	1	1	64	33.4
Isabela	1	0	0	1	0.5
Quebradillas	0	0	0	0	0
Camuy	0	0	0	0	0
Hatillo	1	0	0	1	0.5
Arecibo	11	1	0	12	6.2
Barceloneta	8	0	0	8	4.2
Manatí	0	0	0	0	0
Vega Baja	6	0	0	6	3.1
Vega Alta	1	0	0	1	0.5
Dorado	0	0	0	0	0
Toa Baja	2	0	0	2	1.0
Cataño	11	0	0	11	5.2
San Juan	0	0	0	0	0
Carolina	0	0	0	0	0
Loíza	15	0	0	15	7.8
Río Grande	0	0	0	0	0
Luquillo	7	0	0	7	3.6
South Coast	23	0	2	25	13.0
Patillas	4	0	0	4	2.1
Arroyo	1	0	0	1	0.5
Guayama	2	0	0	2	1.0
Salinas	6	0	0	6	3.1
Santa Isabel	2	0	2	4	2.1
Juana Díaz	0	0	0	0	0
Ponce	4	0	0	4	2.1
Peñuelas	0	0	0	0	0
Guayanilla	1	0	0	1	0.5
Guánica	1	0	0	1	0.5
Lajas	2	0	0	2	1.0
East Coast	29	0	1	30	15.6
Fajardo	5	0	1	6	3.1
Ceiba	2	0	0	2	1.0
Naguabo	1	0	0	1	0.5
Humacao	10	0	0	10	5.2
Yabucoa	4	0	0	4	2.1
Maunabo	3	0	0	3	1.6
Vieques Island	1	0	0	1	0.5
Culebra Island	3	0	0	3	1.6

(CONTINUED ON NEXT PAGE)

Cont. Serv. Aux. Oper. Cent., 1970, No. 1					
West Coast	50	20	3	73	38.0
Cabo Rojo	5	20	1	26	13.5
Mayaguez	11	0	2	13	6.8
Añasco	3	0	0	3	1.6
Rincón	8	0	0	8	4.2
Aguada	12	0	0	12	6.2
Aguadilla	11	0	0	11	5.7
Total	165	21	6	192	100.0

dory type; small, roughly constructed, and with a restricted cruising range. Table 6 shows distribution in length and propulsion (horse-power) of commercial fishing craft by coastal region in Puerto Rico, 1969. Approximately 57% of all fishing boats are between 16 to 18 feet in length. The most common mode of propulsion is the outboard motor, from 6 to 10 horse-power (38%).

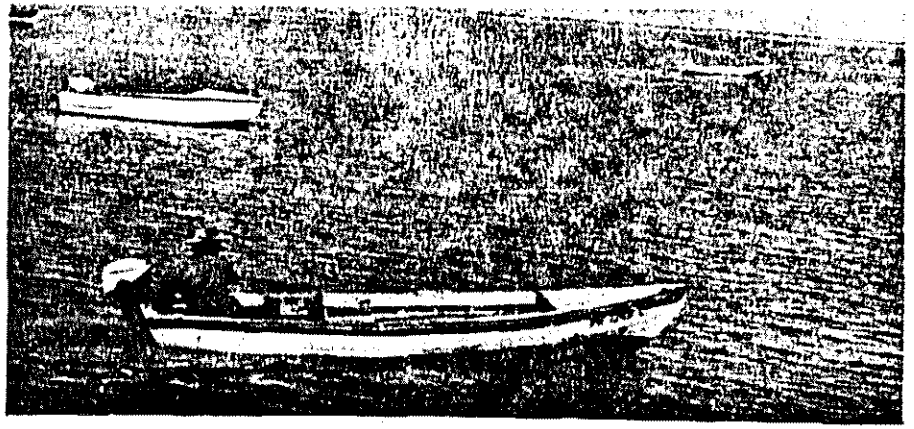

Fig. 7 - 16-foot outboard motor fisbing boat called "yola" is tbe most popular fisbing craft in Puerto Rico.

Fishing gear

The total number of units of Puerto Rico's inshore fishing gear of all types was 12,125 in September 1969 (Table 7). A brief description of the main types (taken from Dumont and Sundstrom, 1961), and percentage relative to the total number of fishing units is given below.

Fish pot: it is the most common fishing gear unit (62.8%) in Puerto Rico. The fish pot is generally heart (arrow head) shaped, with one downward curving entry funnel at the apex. This is a tappered funnel to prevent escape of the catch (fig. 8). The pot

is about 5 feet long by 5 feet wide and 1.5 feet high, constructed of mangrove pole frames and galvanized chicken wire. It is fished as single unit with a separate buoy line or several buoys attached to one main line.

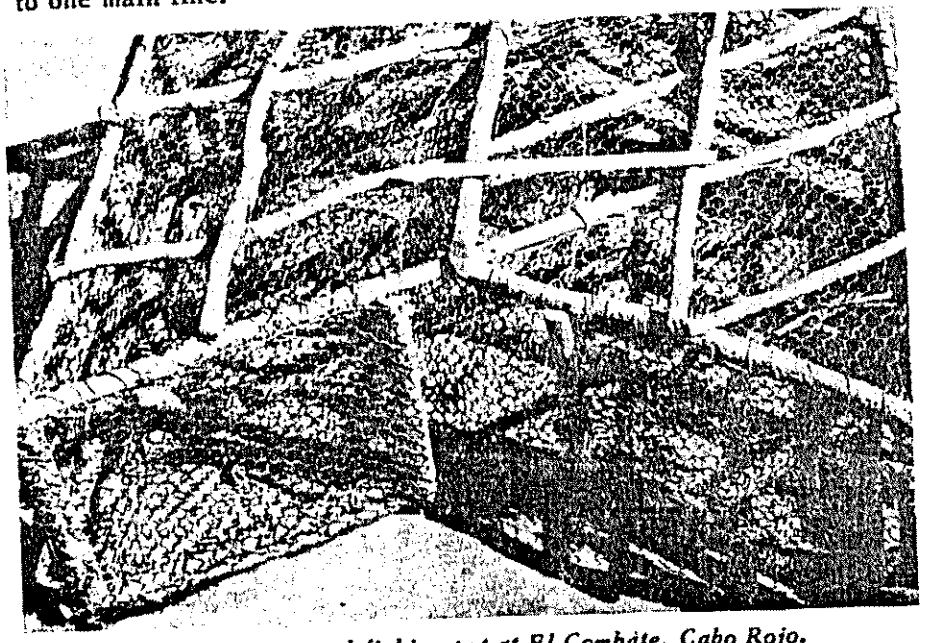

Fig. 8 - Conventional fisbing pot at El Combate, Cabo Rojo.

Troll line: this fishing gear was second (9.0%) to the fishing pot. It is a long single line, with one or more barbed hooks at the free end of the line, baited with either a natural or artificial lure, and towed behind a moving boat (fig. 9).

Fig. 9 - Troll line with spoon used at La Puntilla, Cataño.

Table 6 - Distribution in length and propulsion (horse-power) of Puerto Rico's inshore commercial fishing craft by coastal region, 1969.

LENGTH (FEET)	COAST NORTH	SOUTH	EAST	WEST	TOTAL	%
4 - 6	1	0	0	0	1	0.1
7 - 9	1	1	0	0	2	0.3
10 - 12	7	15	14	11	47	6.0
13 - 15	30	66	38	42	176	22.4
16 - 18	140	123	83	105	451	57.3
19 - 21	15	11	21	7	54	6.8
22 - 24	7	2	15	3	27	3.4
25 - 27	0	2	1	9	12	1.5
28 - 30	0	0	6	6	12	1.5
31 - 33	0	0	1	1	2	0.3
34 - 36	0	0	0	1	1	0.1
More than 36	0	2	0	0	2	0.3
Total	201	222	179	185	787	100.0
Motor (horse-power)						
1 - 5	6	6	2	5	19	3.0
6 - 10	71	95	18	61	245	38.4
11 - 15	31	37	19	18	105	16.5
16 - 20	20	46	63	27	156	24.5
21 - 25	1	2	3	1	7	1.1
26 - 30	0	2	3	0	5	0.8
31 - 35	4	6	31	4	45	7.0
36 - 40	2	3	14	0	19	3.0
41 - 45	1	1	0	1	3	0.5
46 - 50	0	1	1	0	2	0.3
More than 50	7	5	2	17	31	4.9
Total	143	204	156	134	637	100.0

Table 7.- Number of Units of Puerto Rico's inshore commercial fishing gear by coastal regions and municipalities, 1969.

REGION AND MUNICIPALITY	HAUL SEINE	FISH POTS	SPINY LOBS. POTS	GILL NET	TURTLE NET	HAND LINE	TROLL LINE	LONG LINE HOOKS	POLE AND LINES	CAST NET	SPEAR	OTHERS	TOTAL	%
North coast	32	150	6	175	105	289	354	27	46	270	42	9	1505	12.41
Isabela	—	6	6	1	—	11	8	2	—	6	1	—	41	.34
Quebradillas	—	—	—	—	—	2	—	—	—	—	—	—	2	.02
Camuy	—	—	—	5	—	7	6	1	5	6	1	—	31	.26
Hatillo	—	—	—	3	—	5	13	2	2	7	—	—	35	.29
Arecibo	3	—	—	9	—	96	67	1	6	36	5	—	237	1.95
Barceloneta	4	33	—	49	4	28	45	—	9	38	2	—	243	2.00
Vega Baja	12	56	—	14	23	21	29	8	4	16	1	—	131	1.08
Vega Alta	1	14	—	8	16	19	6	2	8	16	—	—	76	.63
Dorado	1	—	—	4	4	3	6	3	—	15	6	—	71	.59
Toa Baja	1	29	—	6	—	—	—	—	—	8	—	—	14	.12
Cataño	—	—	—	43	24	18	87	4	8	60	10	—	259	2.14
San Juan	1	4	—	—	15	32	46	1	—	33	10	—	137	1.13
Río Grande	—	—	—	—	—	1	2	—	—	1	1	—	22	.18
Loíza	—	17	—	23	16	38	27	3	4	15	1	8	147	1.20
Luquillo	6	6	—	10	5	8	12	—	—	13	4	1	59	.48
South coast	3	5	—	116	256	117	269	56	8	96	32	6	4308	35.53
Patillas	29	3118	225	50	8	22	23	7	—	3	—	—	366	3.02
Arroyo	3	270	—	37	36	7	26	6	—	1	—	—	399	3.29
Guayama	1	285	—	9	36	2	39	2	4	19	2	—	620	5.11
Salinas	6	501	—	17	34	12	28	3	4	13	5	6	743	6.13
Santa Isabel	4	592	225	3	13	—	21	9	—	17	2	—	183	1.51
Juana Díaz	3	115	—	—	11	4	8	5	—	2	5	—	300	2.47
Ponce	8	257	—	1	39	10	10	4	—	9	—	—	166	1.37
Peñuelas	2	91	—	—	—	11	9	—	—	7	2	—	130	1.07
Guayanilla	—	101	—	6	13	16	20	12	—	17	9	—	200	1.65
Guánica	—	107	—	6	29	18	67	5	—	5	4	—	721	5.95
Lajas	2	585	—	7	17	15	18	3	—	3	5	—	480	3.96
East coast	—	414	—	—	—	—	—	—	—	—	—	—	3799	31.25
Fajardo	13	2608	412	32	160	137	234	11	3	125	39	15	802	6.61
Ceiba	4	437	113	8	55	63	66	6	1	40	9	—	347	2.86
Naguabo	3	261	48	2	8	1	15	—	—	5	4	—	610	5.03
Humacao	2	549	—	—	12	14	22	—	—	9	2	—	818	6.75
Yabucoa	1	688	—	—	23	4	67	4	—	28	3	—	141	1.16
Maunabo	—	78	—	1	15	16	21	—	—	10	—	—	56	.46
Culebra	3	11	—	12	27	—	2	—	—	1	—	—	438	3.62
Vieques	—	146	251	—	—	5	20	1	2	11	2	—	577	4.76
West coast	—	438	—	9	20	34	21	—	—	21	19	15	2523	20.81
Cabo Rojo	38	1743	—	32	68	219	240	79	2	88	14	—	1671	13.78
Mayaguez	4	1456	—	20	68	44	41	14	—	16	8	—	287	2.37
Añasco	6	151	—	4	—	32	50	28	—	33	3	—	54	.45
Rincón	2	33	—	—	—	—	12	4	—	3	—	—	139	1.15
Aguada	3	72	—	2	—	16	18	7	—	11	—	—	30	.25
Aguadilla	13	—	—	—	—	5	7	1	—	4	—	—	342	2.81
Total	10	31	—	6	—	112	132	25	2	21	3	—	12125	1.00
%	132	7619	643	355	569	762	1097	175	59	579	127	30	100	
	.92	62.84	5.30	2.93	4.69	6.28	9.05	1.43	.49	4.78	1.05	.25		

Hand line: it is third (6.2%). A hand line is a single line with one or more hooks held or attended by one fisherman. At the end of the line 4, 6 or 8 hooks are hung from a hard frame of galvanized wire ("ballestilla"), with a three to five pound lead attached to the center (fig. 10).

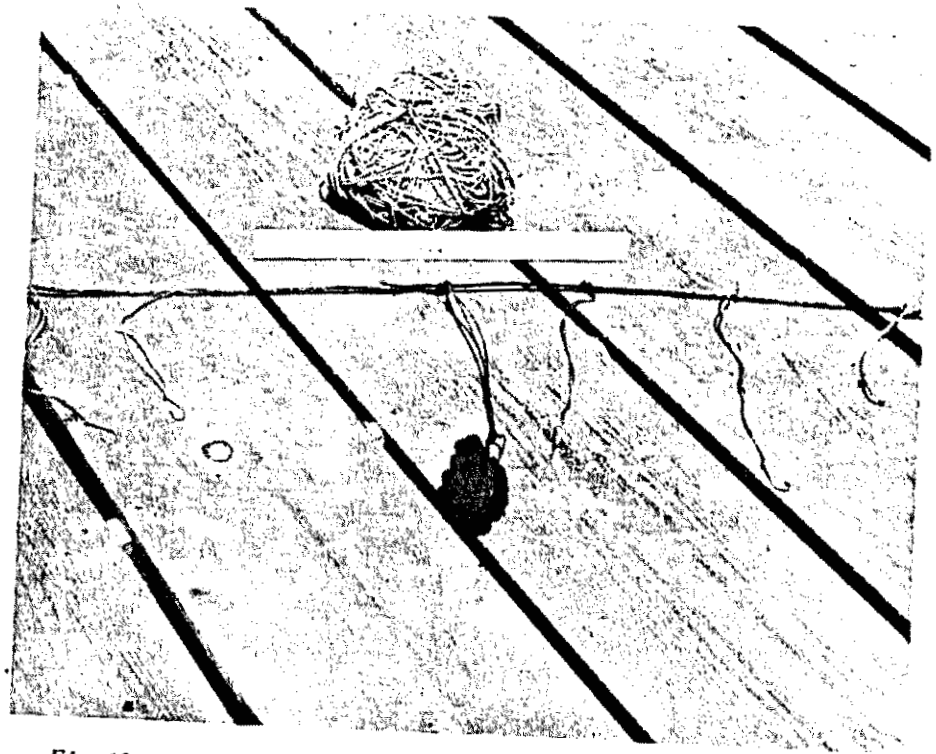

Fig. 10 - Hand line for fishing silk snapper at El Combate, Cabo Rojo.

Spiny lobster pot: it comprises only 5.3% of the total units of gear. This type of pot ("cajon") is restricted to a few fishing centers (Table 7). One type of spiny lobster pot is made of galvanized chicken wire and mangrove poles. It is of various designs and dimensions, which resembles the fish pots described before (fig. 11). Typical Florida type wooden lobster pots (Juhl,

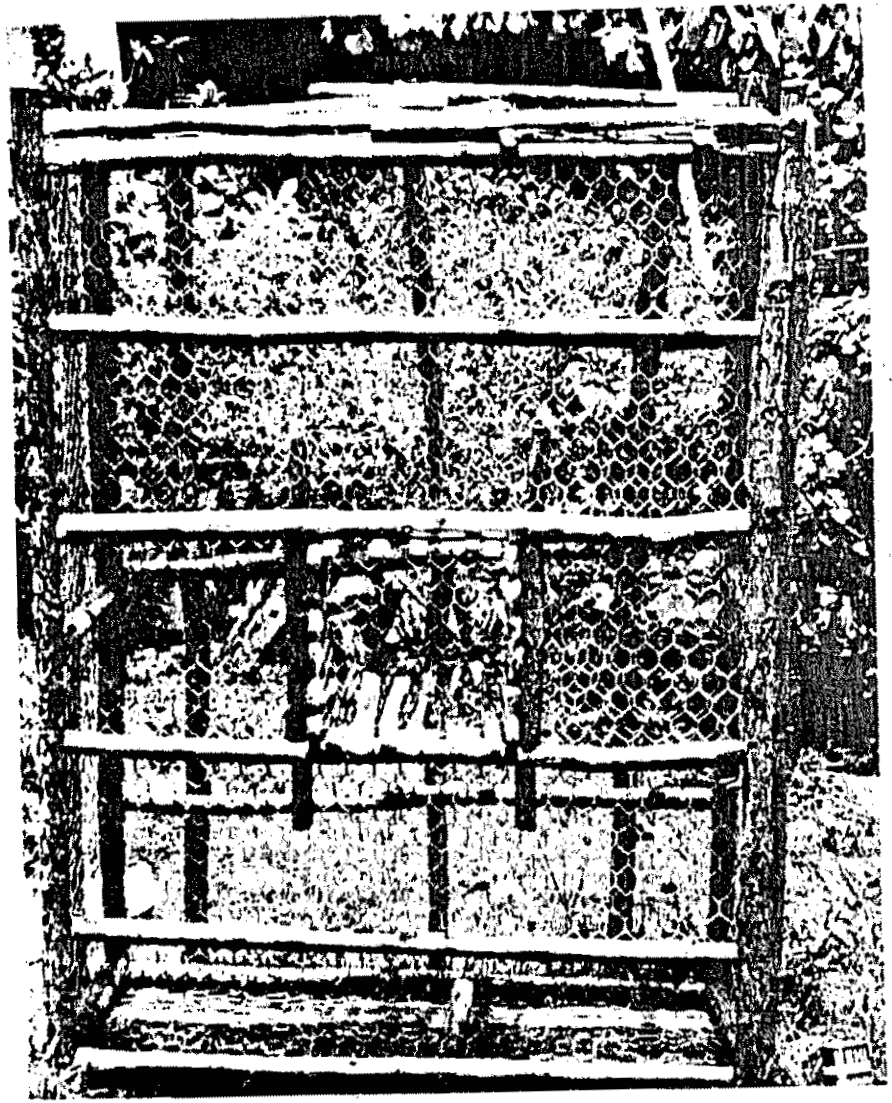

Fig. 11 - Spiny lobster fishing pot at Las Croabas, Fajardo.

1969 and Feliciano, 1958) have been introduced in Puerto Rico in recent years. They are about 32 inches long, 25 inches wide and 16 inches high, constructed of precut cypress slats and 1 x 1 inch strips of pine or spruce (fig. 12).

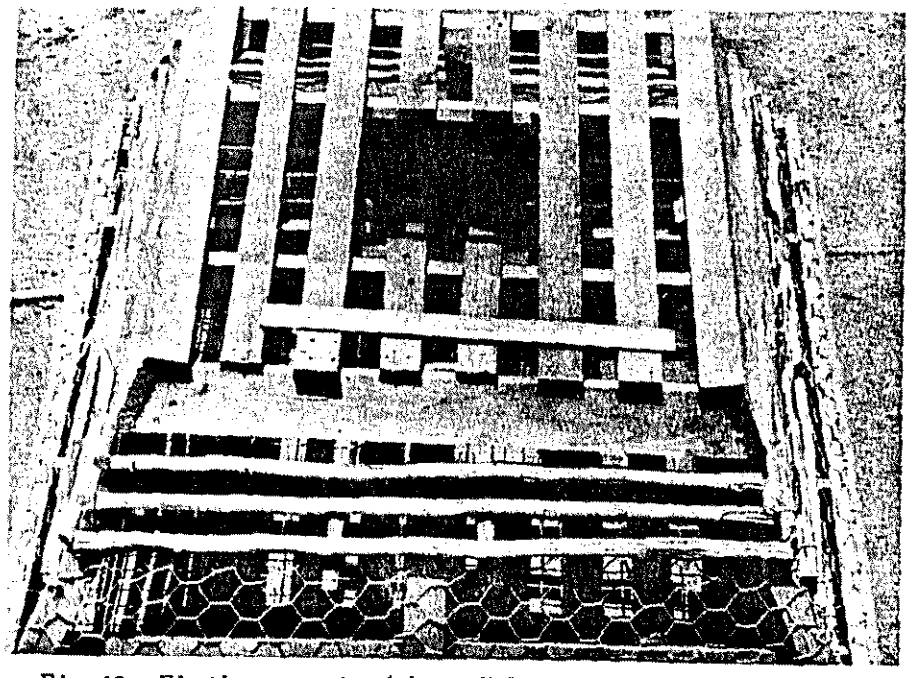

Fig. 12 - Florida type spiny lobster fishing pot used at Camino Nuevo, Yabucoa.

Cast net: this fishing gear is popular in Puerto Rico (4.7%). Almost every fisherman has one cast net ("atarraya") for catching small fish for bait. It is a circular cone-shaped net thrown by hand to trap the fish. When thrown on the water's surface, the leads on the outer edge of the net sink rapidly to the buttom, thus entrapping the fish. The net is then recovered by slowly pulling the recovery line attached to its center. The net's diameter varies from 6 to 15 feet.

Turtle net: its abundance is only 4.6%. It is a special type of gill net for catching sea turtles. This turtle net ("volante" or "chinchorro de carey") is made of a single wall of net 4 to 6 yards depth by 20 to 80 yards long, the mesh is 20 to 24 inches, stretched measure.

Gill net: it is a common fishing gear on the north coast of Puerto Rico (Table 7). Nevertheless, it is not as abundant as the turtle net (3.0%). A gill net is a fence of fiber webbing (fig. 13) in which the fish are caught (gilled) in the meshes of the net. Various sizes of mesh are used depending on the species and size of

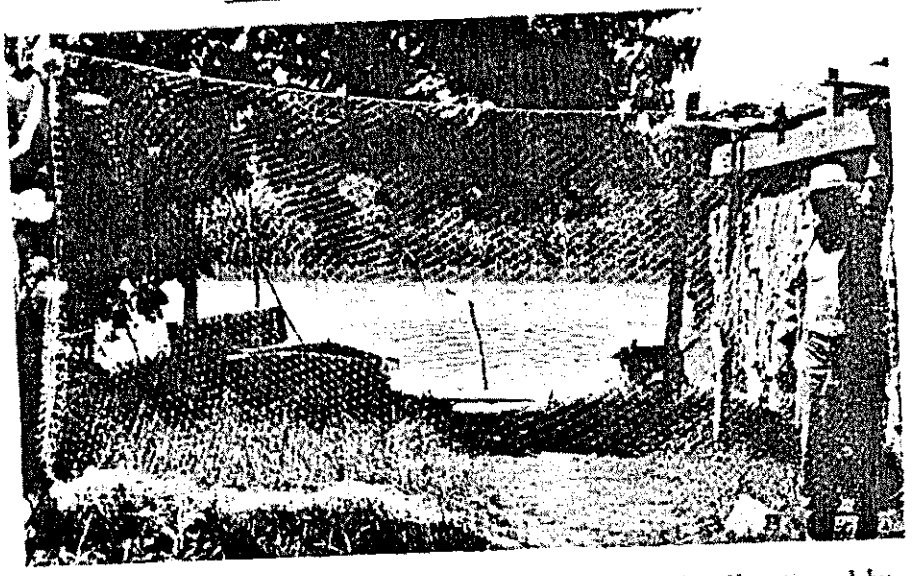

Fig. 13 - Six hundred yards length by four yards depth gill net used by fishermen at Puerto Real, Fajardo.

the fish to be caught. Its height and length are also variable. Several types are in use, such as bottom and surface gill net called "trasmallo or filete", and the trammel net called "mallorquin".

Trot line: this type of gear ("palangre") (1.4%) is a long fishing line with a series of baited hooks on short, separate, branch lines (fig. 14). The gear can be anchored or left drifting and requires only periodic attention.

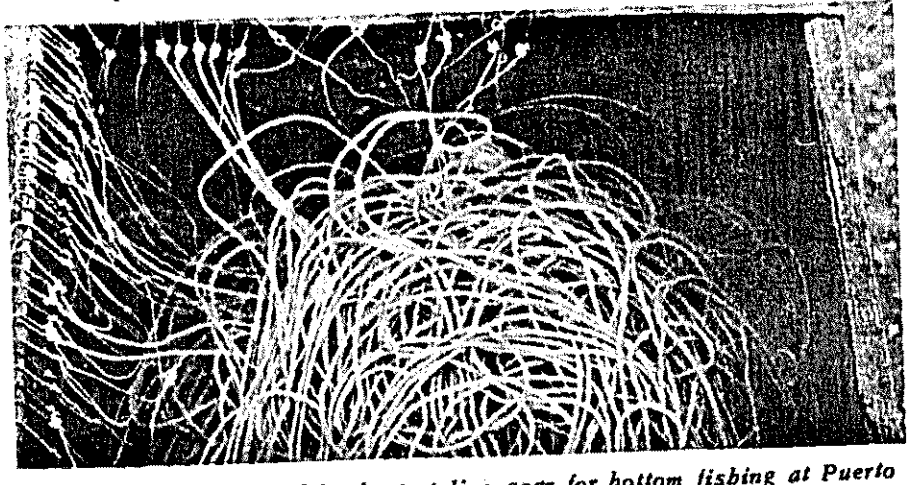

Fig. 14 - One hundred hooks trot line gear for bottom fishing at Puerto Real, Cabo Rojo.

Spear: in Puerto Rico's inshore commercial fisheries this type of gear has a limited use (1.0%). Generally, the spear ("fisga") is used by the fishermen with a diving outfit. They catch mainly lobster or big fish with this gear.

Haul seine: this is an encircling type of net (0.9%) made of mesh webbing and consisting of two wings and a bag. The top line has floats to keep it at the surface while the bottom or foot line is weighted. The bag is flanked by wings to which are attached auxiliary lines. In Puerto Rico a haul seine ("chinchorro") is generally set from a row boat and hauled to the shore line or to the beach by 8 to 10 auxiliary fishermen.

Pole and line: it is utilized principally by sport fishermen, However, a few commercial fishermen used pole and line (0.5%) occasionally (fig. 15).

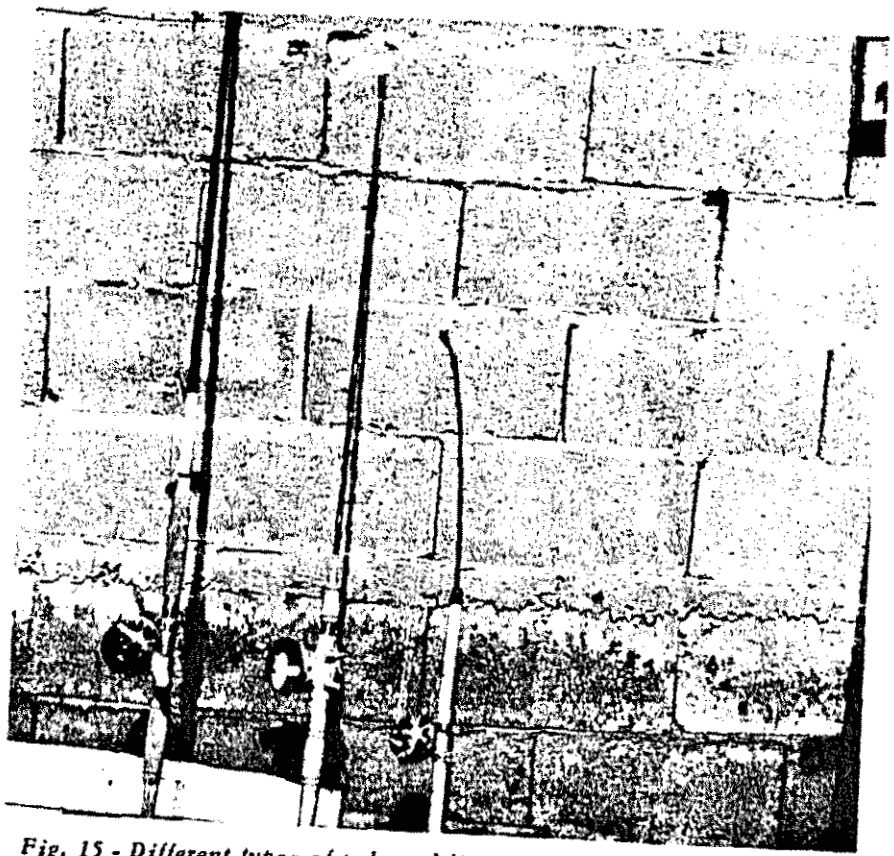

Fig. 15 - Different types of pole and line used at La Puntilla, Cataño.

Others: the hand reel is the only gear listed under this category. It holds about 1,500 feet of 3/64th. stainless steel stranded cable. Four to six circle hooks, sizes 7, 8 and 9 are fished from each line (Juhl, 1969). Hand reels have been reported only from Salinas and Vieques Island (Table 7, 0.2%). Deep water fishes as snappers and groupers are caught with this type of gear. Sometimes a home made imitation of the conventional hand reel (fig. 16) is used.

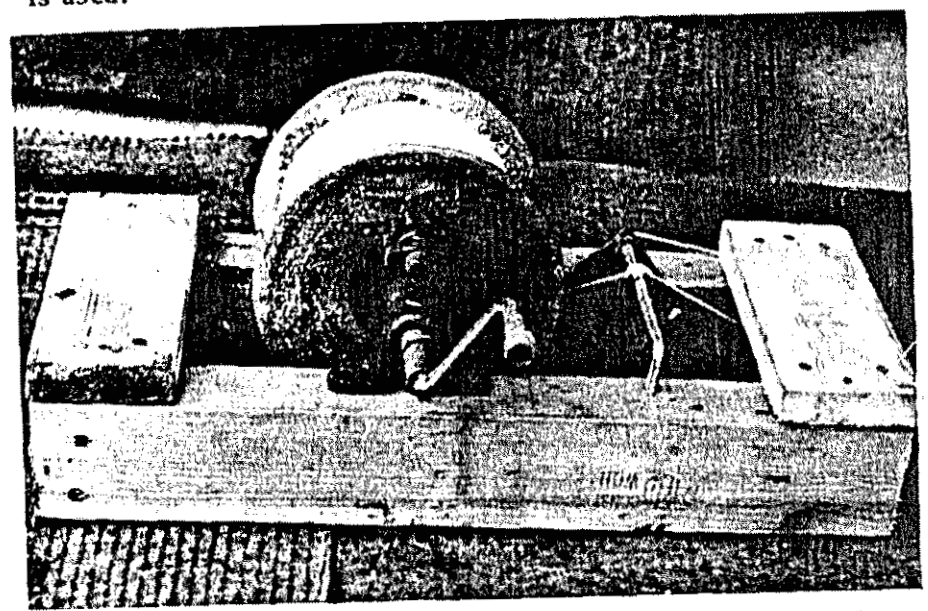

Fig. 16 - Home made hand reel for deep fishing at La Puntilla, Cataño.

CONCLUSIONS

The sales ticket system which was implemented in July 1967, to obtain information on weight and value of fish and shellfish in Puerto Rico's coastal commercial fisheries, has been improving substantially during the fiscal year 1968-1969. It has been shown that useful and accurate landing data could be collected by qualified statistical agents.

According to the results of this Statistical Project, at the present time, it is premature to estimate accurately figures of total landings of fish and shellfish in Puerto Rico. However, a complementary survey to determine the actual production should be carried

out to check the information obtained through our sales ticket system. This canvass should be planned on the basis of fishermen listed in the last survey of fishermen, craft and gear, which was undertaken by the author from April through September 1969. In this way a true picture of the total production of Puerto Rico's inshore commercial fisheries could be obtained.

Definitely the southwest coast of Puerto Rico (Cabo Rojo, Lajas and Guanica) is the most productive area, followed by other fishing centers at Fajardo, Vieques Island, Aguadilla, Mayaguez, Naguabo and Humacao.

Information on landings by species was obtained on about 25 kinds of fishes, of these snapper, mackerel and grouper make up about 75%.

Shellfish production by species was relatively easy to obtain. However, figures on land crab catches were extremely low and inaccurate on account of the way crab was caught and sold. Hundreds of persons (not necessarily fishermen) mainly out of the fishing centers throughout the island, catch them with special traps (fig. 17; and Feliciano, 1962). Strings of a dozen crabs each are then sold directly to the consumer. For this reason it is extremely difficult to gather statistical information on this item.

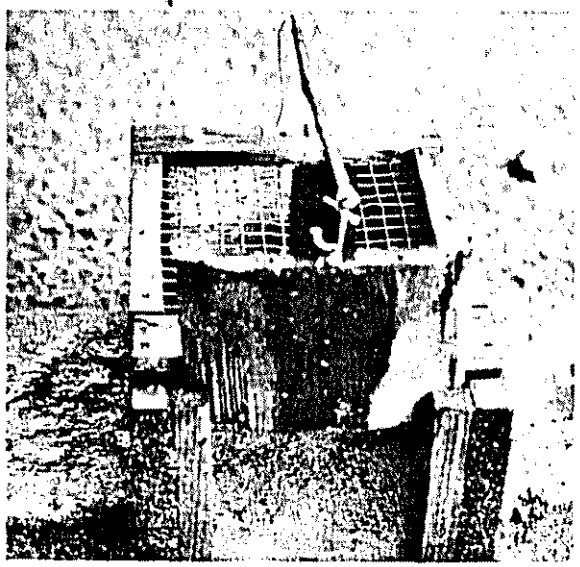

Fig. 17 - Land crab trap (12" x 8" x 5") at El Maní, Mayaguez.

Only 38% of the fishermen are regular. Cabo Rojo shows the highest percentage of regular fishermen followed by Aguadilla and Vieques Island. The first two areas were among the best producing fishing centers.

Sixty two per cent of Puerto Rico's inshore commercial fishermen are casual or part time. In Loiza, Yabucoa, Maunabo and elsewhere they fish part of the year because they work seasonally in agriculture.

A deckhand is a fishermen's helper, called "compañero". He has no boat nor gear, and he assists in fishing activities on board or ashore. They are persons who live in the fishing communities and when they have free time help fishermen haul a seine or go on board and help lift fish pots. However, a small group of them have been classified as regular deckhands when it was found they fit the classification of regular fishermen.

Most of the fishermen are boat owners, and it means better prices for their landings. The average number of fishermen per boat crew is about two. However, in some particular fishing centers such as Cabo Rojo may be three or more. Conversely, there are areas such as San Juan, Culebra and Vieques Islands, Playuela and Mayaguez with only one crew member.

Seventy-six percent of the fishing boats are motorized. The highest percentage occurred on the south coast (33%). The most popular fishing boats are between 16 to 18 feet length with outboard motors from 6 to 10 horse-power.

The fishing pot is the most common fishing gear in Puerto Rico (62.8%) and appears to be the most effective gear for the island inshore commercial fisheries. The north coast with 1.9% of the fish pots is the poorest fishing area. However, exploratory fishing and gear tests using fish pots, by the Department of Agriculture exploratory fishing boat "*Agustin Stahl*" has shown the effectiveness of that gear, especially along the north coast of Puerto Rico (Juhl, 1969).

The fish pot is followed by the troll line (9%), the hand line (6.2%), the spiny lobster pot (5.3%), the cast net (4.7%), the turtle net (4.6%), the gill net (3.0%), the trot line with hooks (1.4%), the

spear (1%), the haul seine (0.9%) and pole and line (0.5%). Hand or electric reels, for deep water fishing or winches for lifting fish pots, have been shown their efficiency in Puerto Rico's inshore commercial fisheries (Juhl, 1969). Nevertheless, this type of gear was only 0.2% of the total on the island and was found only at Vieques Island, Salinas, Loiza and Luquillo.

ACKNOWLEDGMENTS

Many people provided information for carrying on this project. Throughout the Island, fishermen, fish dealers, Fish and Game Wardens, Agents and personnel of the Statistical Program assisted the author in obtaining and processing data for this paper. Consequently, it is impossible to name everyone, but he wishes to give all of them his sincere thanks for their contributions.

Mr. Rolf Juhl, Coordinator of the Fisheries Development Program (PL-88-309) in Puerto Rico, critically reviewed the manuscript and made useful suggestions. His help is gratefully acknowledged.

The author is also indebted to Mr. Felix Iñigo, Chief of the Division of Fish and Wildlife, Department of Agriculture, and personnel of his Office, for letting him use their files and sharing with him his long experience in the Puerto Rican fisheries. Mr. Donald S. Erdman, of the above mentioned Division, read and commented on the manuscript, and made interesting observations.

LITERATURE CITED

ANONYMOUS

1944. Plan for the rehabilitation of the fishing industry of Puerto Rico. Fish. Bull. Puerto Rico, 1 (3): 3-15.

1964. Manual for conducting statistical surveys of the fisheries of the United States. U.S. Dep. Int., Bur. Comm. Fish., Comm. Fish. AL-11, 59 pp.

1968. Atun extranjero mantiene industria en Puerto Rico. Rev. Pesca, Peru, pp. 41-44.

CAILLOUET JR., C.W., R.J. GARCIA and J.B. HIGMAN.

1968. Technical assistance and supervision of commercial fisheries statistics and marketing in Puerto Rico. Annu.

Rep. Dep. Agric. Comm. Puerto Rico, ML 68241, Inst. Mar. Atmos. Sci., 12 pp.

CAILLOUET JR., C.W. and J.B. HIGMAN

1969. Technical assistance and supervision of commercial fisheries statistics and marketing in Puerto Rico. Annu. Rep. to Dep. Agric. Comm. Puerto Rico, ML 69132, Inst. Mar. Atmos. Sci., 42 pp.

DIAZ PACHECO, S., M. VELEZ and P.B. VAZQUEZ CALCERRADA.

1943. Practices and operating costs of Puerto Rican fishermen. Agric. Exp. Stat. Univ. P.R., 30 pp.

DIBBS, J.L.

1967. Report of marketing study of two Puerto Rican fishing communities. UNDP/FAO Caribbean Fish. Develop. Project, 9 pp.

DUMONT, W.H. and G.T. SUNDSTROM

1961. Commercial Fishing gear of the United States U.S. Dep. Int., Fish. Wild. Ser., Bur. Comm. Fish., Fish Wild. Circular 109, 61 pp.

FAO

1962. Report to the Government of Puerto Rico on the Resource Appraisal Project for the Possible Expansion of Local Fisheries. FAO/EPTA Rep. (1482), based on the work of E. O. Oswald, 15 pp.

1966. Notes on completion of forms: Statistics on Fishermen Commercial and Subsistence. Fisheries Circular No. 71, 2 pp.

FELICIANO, C.

1958. The Lobster Fishery of Puerto Rico. Proc. Gulf Caribbean Fish. Inst. 10th. Annu. Sess., pp. 147-156.

1962. Notes on the Biology and Economic Importance of the Land Crab *Cardisoma guanhumi*, Latreille of Puerto Rico. Spec. Cont. Inst. Mar. Biol., Univ. Puerto Rico., 29 pp.

HESS, E.

1960. Fisheries Problems in the West Indies, Proc. Gulf Caribbean Fish. Inst., 12th. Annu. Sess., pp. 88-93.

HOLMSEN. A. A.

1966. Economics of Puerto Rico's Inshore Fisheries and Rec-

ommendations for their Development. Report to Hon. Sec. Agric. Comm. Puerto Rico, Dep. Agric., 57 pp.

1967. Low production and Old Methods Found in Puerto Rican Inshore Fishery. Maritimes, 11 (1): 5-7.

IDYLL, C. P.

1966. Fishery Resources of the Western South Atlantic and the Caribbean Sea. Proc. 7th. Inter. Congress Nutrition, Hamburg. 4: 3-12.

IÑIGO, F.

1952. A preliminary report on a survey of the commercial fisheries of Puerto Rico. Caribbean Fish. Conference, Trinidad, 8 pp.

1963. Desarrollo pesquero en Puerto Rico. Rev. Agric. 1 (1): 83-104.

IÑIGO, F. and R. JUHL

1968. Outlook of Puerto Rico's Commercial Fisheries. Proc. Gulf Caribbean Fish. Inst. 20th. Annu. Sess., pp. 128-132.

1968. El fomento de la industria pesquera en Puerto Rico y sus perspectivas. Agric. al Día, Año 15 (3-4): 16-19.

JARVIS, N. D.

1932. The fisheries of Puerto Rico. U.S. Dept. Comm. Bur. Fish. Investigational Rep. 13, 41 pp.

JUHL, R.

1969. Exploratory fishing survey and gear tests in Puerto Rico. Cont. Agrop. Pesq., Dep. Agri. Comm. Puerto Rico, 1 (1): 1-39.

KAHN, R. A.

1949. Economics of production in Puerto Rico. Proc. Gulf Caribbean Fish. Inst. 1st. Annu. Sess., pp. 33-39.

SOLER, P. J.

1951. A bibliography on the fishes and fisheries of Puerto Rico. Proc. Gulf Caribbean Fish. Inst., 2nd. Annu. Sess., pp. 143-149.

WILCOX, W. A.

1902. The fisheries and fish trade of Porto Rico. In Investigations of the Aquatic Resources and Fisheries of Porto Rico by The United States Fish Commission Steamer Fish Hawk in 1899, Bull. U.S. Fish Comm. 1900, 20 (1): 27-48.

1904. The fisheries and fish trade of Porto Rico in 1902. U.S. Bureau of Fisheries Report, (28): 367-395.

CONTRIBUCIONES PUBLICADAS

Vol. I, No. 1 - Rolf Juhl: "Exploratory Fishing Survey and Gear Tests in Puerto Rico", septiembre, 1969.

Vol. II, No. 1 - José A. Suárez-Caabro: "Puerto Rico's Fishery Statistics 1968-1969", abril 1970.

Vol. II, No. 2 - Rolf Juhl: "Ocean Currents: Their Whys Whens and Hows", abril 1970.

Vol. II, No. 3 - Félix Iñigo, Rof Juhl y José A. Suárez-Caabro: "El fomento de la industria pesquera en Puerto Rico y sus perspectivas", mayo 1970.

Vol. II, No. 4 - Rof Juhl, Martin R. Bartlett y Bruce W. Maghan: "Exploratory Fishing in the Western Tropical Atlantic by the Tuna Seiners Normandie and Queen Mary", junio, 1970.

Vol. III, No. 1 - Rolf Juhl y José A. Suárez-Caabro: "La Pesca en Puerto Rico, 1970", marzo 1971.

Vol. IV, No. 1 - Rolf Juhl y José A. Suárez - Caabro: "La Pesca en Puerto Rico, 1971" (Spanish and English), abril 1972.

Vol. IV, No. 2 - Donald S. Erdman: "Inland Game Fishes of Puerto Rico", junio 1972.

Vol. IV, No. 3 - Rolf Juhl: " A Report on Exploratory Fishing and Gear Tests in Puerto Rico from 1969 to 1972", noviembre, 1972.

Vol. IV, No. 4 - Rolf Juhl and José A. Suárez-Caabro: "A report on Fisheries Statistics Program in Puerto Rico from 1967 to 1972" noviembre 1972.

Vol. V, No. 1 - Omni Research, Incorporated: "The Determination of Mercury in Commercially Imported Aquatic Organisms", enero, 1973.

Vol. V, No. 2 - Robert Y. Ting: - Investigation on the Resource Potential of the Spiny Lobster (Panulirus argus Latreille. In Puerto Rico" febrero 1973.

Vol. V, No. 3 - José A. Suárez - Caabro: "La Pesca en Puerto Rico", abril 1973.

Vol. V, No. 4 - Rolf Juhl and José A. Suárez-Caabro: "Fish Pot Fisheries in Puerto Rico", octubre 1973.

Vol. VI, No. 1 - José A. Suárez-Caabro and Miguel A. Rolón: "La Pesca en Puerto Rico", abril 1974.

Vol. VI, No. 2 - Donald S. Erdman: "Nombres Vulgares de Peces en Puerto Rico", octubre 1974.

Departamento de Agricultura
Department of Agriculture
Servicios Auxiliares y Operaciones Centralizadas
Centrallized and Ancillary Operation Services
Apartado 10163, Santurce
P.O. Box 10163, Santurce
San Juan, Puerto Rico 00908